2020 319 Application Form

PART A—GENERAL INFORMATION

Project Name: Returning Lolo Creek to a Natural State

Sponsor Name: Lolo Watershed Group

Registered with the Secretary of State? Y

Registered with SAM? Y

Duns # 079251276

Does your organization have liability insurance? Y

Primary Contact: Kascie Herron

Title: President Emeritus/Contractor

Address: P.O. Box 1354

City: Lolo State: MT Zip Code: 59875

Phone Number: (406)546-2316

Email Address: kascie@lolowatershed.org

Signature: Kascie Herron Digitally signed by Kascie Herron Date: 2019.10.30 15:42:21 -06'00'

Signatory: Tom Morarre

Title: Board Vice President

Address: 14200 Mormon Creek Rd

City: Lolo State: MT Zip Code: 59847

Phone Number: (406)273-0608

Email Address: tmorarre@msn.com

Signature: Thomas A. Morarre Digitally signed by Thomas A. Morarre Date: 2019.10.31 10:25:43 -06'00'

Technical and Administrative Qualifications

The Lolo Watershed Group (LWG) is comprised of volunteer board members who each bring a unique skill set to the work of the organization. In addition to the board of directors, the LWG has an advisory board, whose members supplement the knowledge of the board of directors with various technical and scientific expertise. Please see Attachment A for a list of board members and advisory board members as well as their current professions and roles within the conservation and natural resource fields. In addition, LWG would solicit the design expertise of Amy Sacry from Geum Consulting, as well as John Muhlfeld at River Design Group for engineering and construction. Both have a strong reputation for executing complex and high quality restoration projects such as the one we are proposing in this application.

Past and Current Projects

Project Name	Grant or Contract Amount	Funding Entity *(entity name/program, contact person, phone, email)*	Completion Date
Building Capacity and Collaboration Between Lolo Watershed Stakeholders, Phase II	$ 15,000.00	Montana Department of Natural Resources and Conservation (Watershed Management Grant Program, Lindsay Volpe, 406-444-9766, LmVolpe@mt.gov)	April 15, 2020
Lolo Middle School Watershed Experience: Plants, Water and Dirt!	$ 3,000.00	Soil and Water Conservation Districts of Montana (Education and Outreach Mini-grant Program - 319 funded, Melissa Downing, 406-443-5711, melissa@macdnet.org)	September 15, 2019
Promoting a Healthy Riparian Area for Lolo Creek	$ 4,000.00	Montana Department of Environmental Quality (Bitterroot Watershed Project Planning Funding, Hannah Riedl, Hannah.Riedl@mt.gov)	October 31, 2019

Funding Request

319 Funds Requested *(**including** administrative fee)*	$ 192,500.00
State Cash Match	$ 122,000.00
Local Cash Match	
In-Kind Match	$ 9,500.00
Federal Funds	$ 1,500.00
Other Funds *(not 319, not match, not federal)*	$ 3,000.00
Total Project Cost	$ 328,500.00

Administrative Fee *(not to exceed 10% of total 319 funding request)*	$ 17,500.00
Total Non-Federal Match	$ 131,500.00

Part B—Project Information

Part B must be filled out separately ***(including providing separate attachments)*** for each project included in your application. Use the following examples to help determine when to lump and when to split projects. If additional clarification is needed, contact Mark Ockey, at 406-444-5351 or mockey@mt.gov.

Splitting Examples (fill out multiple Part B's)

- Stream restoration work occurring on two separate streams, on parcels owned by two separate individuals
- Two projects with significantly different sets of project partners
- Two projects that address substantially different pollution sources (e.g., one project that moves a corral off of a stream, and another to remove mine tailings, with both projects being on the same 800-acre recreational property)

Lumping Examples

- Contiguous stream restoration work spanning multiple land parcels
- 3 projects that address similar sources of pollution on a single land parcel (e.g., moving a coral off a stream, implementing a grazing management plan, and relocating a manure storage facility out of the floodplain, all on the same ranch)
- A mini-grant program designed to address numerous failing septic systems scattered throughout a watershed

Project *(sub-project)* Name Returning Lolo Creek to a Natural State - Zens Property

Total Project Cost *Include costs already incurred, as well as anticipated costs, from all sources, for all aspects of the project.* $ 328,500.00

Latitude 46.752565 Longitude -114.233741

Map Y

Latitude Longitude

Latitude Longitude

12 Digit HUC #(s) Lower Lolo Creek (170102051409)

Waterbody Name from 2018 List of Impaired Waters Lolo Creek

Probable Causes of Impairment to be Addressed Physical substrate habitat alteration and Sediment

Waterbody Name from 2018 List of Impaired Waters Lolo Creek

Probable Causes of Impairment to be Addressed Physical substrate habitat alteration and Sediment

Project Summary - Briefly describe the ***nature and extent*** of the problem, the ***root causes*** of the problem, and your ***proposed solution***.

Lolo Creek has been listed as an impaired stream on the EPA's 303(d) list for sediment. A TMDL and TMDL implementation evaluation were written by DEQ for Lolo Creek in 2003 and 2012. LWG also developed a Watershed Restoration Plan, using much of the data collected in the TMDL to list recommendations for projects that would help reduce this pollution. One identified cause for this pollution includes accelerated stream bank erosion along many sections of Lolo Creek, as well as the lack of natural meanders, which is contributing to downstream sedimentation. In addition, the lack of stream complexity (i.e. large woody debris) is not helping with current dissipation of flow and therefore sediment delivery. Various landowners (both public and private) are impacted by this pollution, often downstream of the problem location, therefore this issue is pervasive in the watershed. An overview of Lolo Creek on the Zens property, the property of focus for this project, is provided in Attachment B, Zens Project Concept Overview. The Zens property includes approximately 3,330 feet of Lolo Creek. The primary impairments to this section of stream include: channel confinement with riprap, channel straightening, channel over-widening, grazing that has reduced riparian vegetation cover, loss of instream cover (pools and woody debris, and accelerated streambank erosion.) The upper 250 feet of Lolo Creek on the property flows along Highway 12, which is stabilized by riprap. Downstream of the bridge, and likely as a result of channel stabilization, the channel has straightened and over-widened and consists of a long, shallow riffle with little instream cover. DEQ has identified agriculture as a nonpoint source of sediment pollution and the probable source of impairment to Lolo Creek in the 2018 assessment. Riparian vegetation cover and diversity have been reduced by long term grazing in this area. Immediately along the channel, riparian vegetation is more diverse, with several age classes of cottonwoods and willows establishing on recent depositional features. Some active erosion is occurring at the upstream end of this berm in response to wood accumulation and beaver activity. The berm disconnects the channel from a diverse floodplain area with several historic over flow channels that have transitioned into floodplain wetlands. The downstream-most meander on the property is actively eroding into a low floodplain terrace. Streambank stabilization treatments, including log and rock vanes and rootwad revetments, were installed by NRCS along this bank circa 2003 to reduce the accelerated lateral erosion. These treatments have since eroded out, and the bank is poorly vegetated and continues to actively erode. A complete project background is described in Appendix B.

The goal for restoration at the Zens Property is to maximize channel and floodplain function by increasing channel and floodplain diversity. As described above, the channel largely remains connected to the floodplain, and there are several areas that support good riparian and wetland vegetation and high topographic floodplain diversity. A complete description of the proposed solution to these issues is included in Attachment B. In summary we would propose to 1) Construct channel meanders to increase channel diversity and activate more floodplain area, 2) Construct side channel and floodplain feeder channels to increase floodplain diversity and wetlands, 3) Remove berm along streambank to reactivate floodplain, 4) Realign the channel away from the eroding streambank at the downstream end of the property, 5) Preserve existing and increase high-quality floodplain and riparian areas.

Continuation of previous or ongoing activity? If "Yes", please explain the relationship.

No, this is not a continuation of a previous or ongoing activity. This will be a new project.

Watershed Restoration Plan (WRP) and authoring entity

Lolo Creek - Lolo Watershed Group

Letter of support from WRP authoring entity? If "No", please explain.

Y

EPA approved in March 2013

How will this project implement recommendations in the WRP?

Our proposed project would implement the following recommendations identified in the Lolo Creek WRP, which are activities specified to address the problem of sediment pollution in Lolo Creek:

1. Allow meanders to develop and replace lost stream meanders
2. Enhance beaver habitat
3. Work with private landowners to stabilize streambank erosion with natural methods while abating impacts of agriculture
4. Allow recruitment and establishment of woody debris

These activities are listed in detail in the Lolo Creek WRP in Table 8.1 Lolo Creek Watershed Restoration Plan: problems, assistance needs, implementation schedule, measurable milestones. This table begins on page 76 of the WRP.

Nonpoint Source Goals

LWG's nonpoint source goals are to reduce and slow the dissipation of sediment to Lolo Creek. While sediment deposition is a natural process, Lolo Creek has lost much of its natural function due to the straightening and human channelization, or habitat alteration of the creek over generations. The overarching goal of all of our activities is to help restore Lolo Creek back to a resilient system and a creek that deposits sediment naturally and in symbiosis with a fully functioning aquatic habitat. This project directly works towards achieving this major goal.

A parallel goal of this project is to provide a model for and open the door to working with private landowners along the creek to realize a healthy and fully functioning riparian habitat throughout the creek corridor. This project provides a model for restoring other areas of the creek's corridor that have been stabilized over the decades using riprap or hardened methods. Our bigger picture goal is not only to correct these methods of stabilization with natural methods that last over time, but to educate landowners on proper techniques and resources available to help with these projects. This project opens the door to more conversations with landowners about the benefits of working with the creek and not against it. Ultimately this will result in more effective sediment abatement to the creek itself.

Partners and Roles

Landowner(s)

Name	Letter of Support Attached?
Marie Ann Zens Kimerly	Y
	N
	N

Other Partners

Name	Role	Letter of Support Attached?
Ladd Knotek	Montana Fish, Wildlife and Parks Ladd will be advising us as we implement this project to ensure our methods are also enhancing fish and other aquatic habitat.	Y
Michael Ivanoff	Montana Department of Transportation Michael will collaborate with us as needed and as the project grows to address issues with the road and bridge along the Zens property.	Y
Jed Whiteley	Clark Fork Coalition Jed is an advisory board member of LWG, and Clark Fork Coalition have been long time partners and collaborators with us as we plan and execute restoration projects.	Y
		N
		N
		N

Planning and Coordination

Planning and coordination includes permitting, design development, landowner agreements, volunteer labor recruitment, partnering and collaboration, alignment with watershed planning efforts, procurement and oversight of contractors, etc.

Planning Activities Already Completed	Documentation Attached?
Partnering and Collaboration	N
Alignment with watershed planning efforts	N
Project planning mini-grant completion, resulting in a project conceptual design	Y
Mapping created for project area	Y
Relationship established with landowner to ensure agreement to complete project	Y
	N

Task Description

To date, we have already completed a significant amount of planning and coordination work needed to ensure the project will move forward and be completed. For instance, we acquired a $4,000 mini-grant from DEQ for project planning in the spring of 2019, which enabled us to subcontract with Geum consulting and develop the conceptual design and restoration treatment that serves as the basis for this project. In addition, we have built relationships with the landowner which is required to ensure the project will actually be implemented. Marie Ann Zens Kimerly is in support of our vision for restoring this section of Lolo Creek and is helping to reach out to her neighbors as well. If we are awarded the funding needed to put the project on the ground, we will need to design the specifics of the construction. This would include data collection and a hydrologic analysis, design preparation, construction planning, and wetland delineation, as well as all necessary permitting required. Project management will also be a major task which will include the procurement of the contractor(s), project oversight, as well as any volunteer recruitment and management. In addition, this project has the opportunity to be expanded or cut down, depending on funding we secure. It was designed in phases, so we can grow the project with future neighboring landowner interest, or start small if we do not receive full funding. That would all be a part of the planning and coordination process.

Deliverables

Data Collection, Hydrologic Analysis
Construction plan and design
As build report
Permit Preparation
No Rise Certification

Non-federal match accounts for both the value of land out of grazing use ($4,500), as well as the volunteers acquired and assisting with replanting efforts ($5,000).

Funding	
319 Funds	$ 35,000.00
Non-Federal Match	$ 9,500.00
Federal Funds	
Other Funds	$ 0.00
Total Cost	$ 44,500.00
Is Match Secured	Y

Timeline Spring 2020 Match Source In-Kind

Project Implementation

Task Description

This project will consist of a significant amount of earth moving, where the creek will be moved in sections and new channels will be created and connected to the main stem of the creek. We will need to furnish wood, mostly from on site, but also from elsewhere if needed, to construct large wood structures. We will complete floodplain treatments as well as wetland enhancement in the lower section of the creek. As a part of the re-vegetation, we will cut and plant willows and conduct large-coverage seeding of the disturbed ground. As a part of implementation and post re-vegetation, fencing will need to be repaired to keep livestock out of the newly planted area. A tentative arrangement with the landowner has been discussed to purchase hay for livestock in exchange for keeping the livestock removed from the newly constructed riparian zones. A comprehensive description of each specific project treatment along with supporting maps are included in zipped Attachment C. In summary, the new channel would be approximately 2,200 linear feet. A total of 1,298 feet of new side channel would be constructed and approximately 3,469 feet of existing distributary channel (old side channels) would be reconnected. Itemized costs for each activity are in Appendix D.

Deliverables

Salvage, Preserve and Transplant Existing Vegetation
Construct Channel Streambed Station
Furnish Wood, Furnish Streambed and Streambank Alluvium
Construct and Connect Side Channels
Construct Large Wood Structures
Construct Woody Debris Matrix Streambank Treatment
Channel fill and wetland creation
Alcove and Wetland Enhancement
Floodplain Treatment
Beaver Dam Analogs
Willow cuttings, vegetate streambanks, and seeding

Funding

319 Funds	$ 140,000.00
Non-Federal Match	$ 122,000.00
Federal Funds	$ 0.00
Other Funds	$ 0.00
Total Cost	$ 262,000.00
Is Match Secured	N

Timeline Summer and Fall 2020 Match Source Future Fisheries

Appropriate Next Step

LWG worked with Geum Consulting in Hamilton, MT to identify riparian areas along the main stem of Lolo Creek that would benefit from restoration. Geum utilized available aerial photos and GIS and identified eight sites that were experiencing accelerated erosion, as well as an altered main stem. The goal was to identify both eroded sites, as well as sites where the creek had constricted or had been altered from its original channel(s). One of the sources of downstream sediment in Lolo Creek is upstream areas that are no longer holding historic sediment due to channelization, or hardened and altered banks. The goal was to identify sites that were experiencing both in order to prescribe a holistic treatment that would address both issues.

Ultimately eight sites were identified, and after followup with each landowner, three sites were available to us to access for a ground truth field trip. After visiting each site, one rose to the top as the best candidate for designing a restoration project: Marie Ann Zens Kimerly property which 3,000 linear feet of Lolo Creek flows through.

The project we are proposing in this 319 grant application is an appropriate next step to the scoping process we conducted this past spring and summer, as we have created a conceptual design ready to implement, as well as support from a willing landowner. If this project is implemented it will serve as a next step in reducing the amount of sediment flowing downstream in Lolo Creek. Because this project will return natural meanders, the velocity will slow and sediment will deposit naturally and in a dissipated concentration. The riparian area of this stretch of creek will also be restored and revegetated and agricultural uses will be restricted. All of these practices will serve as an appropriate next step towards seeing our sediment levels in Lolo Creek reduced, therefore addressing its federally listed impairment.

Sustainability

Marie Ann is a third generation landowner who is committed to seeing this project implemented successfully and has voluntarily offered to remove livestock from grazing the riparian area of the creek. LWG is also committed to working with the landowner in maintaining a healthy riparian area, whether through vegetation efforts or fencing needs. This project is across from Woodman school and among similarly sized agricultural operations. It will be the first of its kind in the watershed and will serve as a model in the community encouraging other potential restoration projects. We will achieve long term sustainability through outreach and education, such as field trips with local schools, about the benefits of reducing sediment in Lolo Creek. Through our regular newsletters, public meetings and other communications efforts, LWG will be critical to sustaining the message of water quality and our role in the process to watershed residents.

Natural Processes

This project is all about returning Lolo Creek to a natural state. As a result of decades of human manipulation, Lolo Creek has moved and shifted its energy and flow, resulting in less healthy stream conditions. While we can't move Highway 12 and correct all of the problems that would truly allow Lolo Creek to flow freely, the Zens project would correct and create over 7,000 linear feet of channel for the creek to move along and around. This will give Lolo Creek the chance to be as free as possible within this stream segment, and respond to future changes with much more resilience. Historic channels are very evident in aerial and topographic analysis, indicating a light touch is all that's needed to allow Lolo Creek to reconnect to these channels and restore itself. In addition, removing agricultural practices from the riparian area will allow this to happen more quickly.

Project Effectiveness Evaluation

Task Description

If we are successful in achieving our goals, we will first witness a slowing and dissipating of sediment within this section of Lolo Creek. We will see the creek move into the newly established channels and eventually reconnecting with its historic channels. Segments of the existing channel that are abandoned due to channel realignment will be graded to support diverse wetland and riparian vegetation communities. These abandoned channel segments would not be filled completely but instead graded to an elevation that maintains hydrologic connectivity to baseflows. Vegetation will thrive and continue to take hold and grow. Fish counts within and below the stretch of creek should also increase. Another indicator of success will be if we have other landowners approach us to discuss potential work on other properties. DEQ's work quantifying riparian cover should be able to detect increased vegetation at this site over time. Finally, sediment load reduction estimates should also result from the stabilization and revegetation of eroding banks.

Deliverables

Aerial imagery (where possible) showing the creek move into newly established channels
FWP annually collected fish shocking data
Plant mortality monitoring results
Before and after photo documentation for three years after project completion
Sediment load estimate data

Funding

319 Funds	$ 0.00
Non-Federal Match	$ 3,000.00
Federal Funds	$ 0.00
Other Funds	$ 0.00
Total Cost	$ 3,000.00
Is Match Secured	Y

Timeline Spring 2021-Fall 2023

Match Source In-Kind/LWG general operating budget

The Bigger Picture

Other Natural Resources

We find this project so desirable because of the benefits it will have not only to the immediate project area, but to downstream resources and fish and wildlife habitat. Restoring meanders and creating new stream channels, as well as woody debris matrices will, in addition to improving stream health, also create quality fisheries habitat. Evidence of beaver has been recorded in this stretch of creek, and the proposed beaver analogs will help promote more of this habitat. The wetland enhancement in the lower section of creek will also create habitat for fish, birds and other wildlife as well as enhancing natural recharging of groundwater.

Climate Resiliency

In the last decade, Lolo Creek has lost connectivity with the Bitterroot River five times. In the last two years, this disconnection has increased from one mile to three miles. A major contributor to the dewatering of Lolo Creek, is that it has lost much of its natural storage capacity, which helps rivers combat over use and low supply. In an era when climate change is resulting in lower snow pack, we are also seeing a downward trend in water levels. But we are also experiencing high velocity run off periods, instead of gradual run off. Natural water storage in the form of floodplain reconnection and wetland creation can help systems like Lolo Creek keep water for longer and during periods of severe drought.

Public Visibility

The lower section of this project is very close to Highway 12, providing an opportunity for signage (if the landowner supports it). The site's accessibility also lends to potential site visits for project partners and the general public. Because of the scale of the project and the large benefit it has not just for Lolo Creek, but also for the private landowner, the hope is that other landowners will warm to restoration practices and be interested in partnering with LWG on future work. Potential field trips to the site with local school students and residents will provide an educational opportunity to share the benefits of this project. FWP has identified that this project has the potential to increase anglers in the area via roadway easements to this section of stream.

Point Source / Nonpoint Source Relationships

There are currently no permitted point sources in the Lolo Watershed, and the WRP authored by LWG only identified nonpoint sources as the cause of Lolo Creek's sediment impairment. Because the impairment is from nonpoint sources, and there are no point source discharges the creek, we cannot draw a relationship between the two in the Lolo Watershed.

Source Water Protection

Drinking water is not a designated use for Lolo Creek, therefore this project will not directly help to protect a drinking water source. However, the Montana Bureau of Mines and Geology is finishing a three-year study in which the relationship between Lolo Creek's surface water and the underlying aquifer has been extensively analyzed. From preliminary reports we believe there is a correlation between surface and groundwater, which is indeed where watershed residents source their drinking water wells. Our belief is that a healthy creek will result in healthier groundwater, even if the extent of this connection is not currently quantified.
Anecdote: A board member's neighbor down stream from the project site (Miller Creek) had her well run dry last year. She had a new one dug. It just went dry again this month. By restoring upstream floodplains, groundwater resources should also improve.

Healthy Watersheds

A healthy watershed is achieved when land practices complement the needs of a living, evolving system like Lolo Creek. This project will be successful because the land surrounding it is managed by people who are good stewards and who want to see a sustainable, healthy and natural creek. A healthy watershed means not only a healthy creek, but also healthy land surrounding the waterbody. This project takes all of the components of the creek and the land that drains into it into account. It also ensures a healthier downstream for the creek, preventing it from becoming further impaired.

PART C—EDUCATION AND OUTREACH

Task Description

Information about the Zens project will be communicated to the public at large through press releases and subsequent media coverage, newsletters mailed and emailed to residents and LWG members, as well as public events. With the help of our Big Sky Watershed member, volunteers will be recruited for assistance with planting, which will also serve as an avenue and audience for education of the importance of water quality and the benefits of this specific project to the watershed. Each year, LWG also hosts a field trip for Lolo Middle School students, where we educate them on the impacts of sediment on water quality and creek health. This project will serve as a perfect field trip site to show the comparison of before and after restoration and an outdoor classroom for students to collect data.

Deliverables

Volunteer event(s) coordinated by the Big Sky Watershed Corps Member
Outreach to local media outlets
Newsletter and email communications updates to members, supporters and watershed residents.
Woodman and/or Lolo School student field trip(s) to site. ($1,500 in mini-grant funding from SWCDM)

Funding

319 Funds	$ 0.00
Non-Federal Match	$ 0.00
Federal Funds	$ 1,500.00
Other Funds	
Total Cost	$ 1,500.00
Is Match Secured	N

Timeline Spring 2021 Match Source Soil Conservation District Mini-Grant

PART D—PROJECT ADMINISTRATION

Task Description

The Project Administrator will be responsible for ensuring grant deliverables happen on time and with high quality. He/she will also complete and submit grant reports, manage contracts with designers and engineers, and provide general oversight and quality control for project implementation. He/she will manage the grant budget, handle all invoicing to DEQ and manage payments to contractors on behalf of LWG.

Deliverables

Contract developed and approved
Landowner contracts and agreements developed and approved
Grant reports submitted on time
Invoices submitted to DEQ and payments made to contractors
Project work happening on time and according to contract terms

Funding

319 Funds	$ 17,500.00
Non-Federal Match	$ 0.00
Federal Funds	$ 0.00
Other Funds	$ 0.00
Total Cost	$ 17,500.00
Is Match Secured	N

Timeline Spring 2020 - Summer 2022 Match Source Future Fisheries

Letters of Support

CLARK FORK COALITION

RE: Letter of support for the Lolo Watershed Group DEQ 319 Nonpoint source Fall 2019 funding application

To Whom It May Concern:

I am writing on behalf of the Clark Fork Coalition in support of the Lolo Watershed Group's application for 319 nonpoint source funding to design and implement projects along the creek to address the negative impacts of sediment on the creek.

The Lolo Watershed Group has been active in the community for nearly 15 years, implementing various planting projects each year for the past five years on private property. The proposed larger scale channel restoration project will be a positive step forward for Lolo Creek and the LWG in their mission to restore and protect the watershed.

In addition to implementing projects, the LWG has conducted extensive outreach to the local community, including agency partners like the Forest Service, as well as private landowners along the creek. They have proven themselves to be a reliable partner, and an organization that accomplishes quite a lot with very few resources.

As an advisory board member for the LWG and PM for the Clark Fork Coalition, I support their application for 319 funding to continue addressing nonpoint sources of pollution into Lolo Creek, and implementing projects that improve water quality.

Sincerely,

Jed Whiteley
Project Manager, Clark Fork Coalition

PO Box 7593
Missoula, MT 59807

T: 406.542.0539
F: 406.542.5632

www.clarkfork.org

Region 2 Headquarters
3201 Spurgin Road
Missoula, MT 59804
Phone 406-542-5500
October 16, 2019

Water Quality Planning Bureau
Attn: Hannah Riedl
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Dear Ms. Riedl:

Please accept this letter of support for Lolo Watershed Group's funding application related to stream enhancement work on main stem Lolo Creek near Missoula. The application requests funding under the Clean Water Act Section 319 Nonpoint Source (NPS) Program administered by the Department of Environmental Quality (DEQ).

The main stem of Lolo Creek is a highly modified, main stem stream reach that traditionally supported high water quality and a great fishery. The proposed project involves one major opportunity to restore more natural stream, riparian , and wetland function to a significant reach on private property. If this project is implemented successfully, it may generate other, similar opportunities on adjacent properties. In that context, it is a significant opportunity that warrants strong consideration for funding.

Please give Lolo Watershed Group's application strong consideration and feel free to contact me if you would like more information related to aquatic resources in the Lolo Creek watershed.

Sincerely,

William Ladd Knotek
Fisheries Management Biologist

United States Department of Agriculture | Forest Service | Lolo National Forest | Building 24, Fort Missoula
Missoula, MT 59804-7297
406 329-3750

October 30, 2019

Dean Yashan
Water Quality Planning Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Yashan:

I am writing in support of the Lolo Watershed Group's application for 2020 319 nonpoint source funding for implementation of their Lolo Creek Sedimentation Reduction Project on the Zen ranch. The Lolo Watershed Group has been active in the community for nearly 15 years. Over the past five years, their restoration focus has centered on successfully implementing various riparian and post-fire planting projects on private property. The shift in focus to this larger scale channel restoration project will be a positive step forward for Lolo Creek and a full realization of LWG's mission to restore and protect the watershed.

In addition to implementing projects, the LWG has conducted extensive outreach to the local community, including agency partners like the Forest Service, as well as private landowners along the creek. They have proven themselves to be a reliable partner, and an organization that accomplishes quite a lot with very few resources.

Lolo Creek is classified as impaired due to sedimentation. The Lolo Creek Watershed Restoration Plan focuses on opportunities for improving cold-water fisheries, habitat for aquatic life, and the reduction of sedimentation. The Lolo Creek Sediment Reduction Project proposes restoration of 3300' of Lolo Creek through the Zen ranch; a ranch that has been in the same family for three generations. This project is broken up into three phases, with the first phase prioritizing the lower stretch of the creek. The goals of this phase are to allow for natural floodplain reconnection, restore channel form by increasing meandering, and narrowing the channel to a more natural width/depth ratio. This project would reduce fine sediments, increase connectivity, enhance aquatic habitat and increase ecological function of the riparian and floodplain corridor.

The main stem of Lolo Creek has been significantly modified but traditionally supported high water quality and a great fishery. The proposed project is one major opportunity to restore more natural stream, riparian, and wetland function to a significant reach by partnering with a private landowner. Partnerships with private landowners are elusive and often beyond the scope of work that can be pursued by agencies such as the Forest Service, yet they often provide great benefit to the resource and the community. If this project is implemented successfully, it may generate other, similar opportunities on adjacent properties. In that context, it is a significant opportunity that warrants strong consideration for funding.

As a proponent of Lolo Creek restoration and a steward of Western Montana's waters, I give my full support for Lolo Watershed Group's Lolo Creek Sediment Reduction Project, Phase I.

Sincerely,

/s/ Traci Sylte

Traci L. Sylte
Fish, Water, and Soils Program Manager
Lolo National Forest

VISION ZERO
zero deaths
zero serious injuries

Montana Department of Transportation

Missoula District Office
2100 W Broadway
PO Box 7039
Missoula MT 59807–7039

Steve Bullock, Governor
Michael T. Tooley, Director

August 16, 2019

RECEIVED
8/20/19

Lolo Watershed Group (LWG)
PO BOX 1354
Lolo, MT 59847

Subject: US-12 Lolo Creek riprap revegetation

Your project to revegetate sites along US-12 and Lolo Creek is acceptable upon MDT review and approval of plans and an approved encroachment permit. Please note that there may be additional requirements and permitting.

Please coordinate the environmental permitting with Michael Ivanoff (406)523-5824. Please coordinate the on-site work schedule and traffic control with Chad Seelye (Lolo Pass Section) and Jason Shorten (Superintendent). The encroachment permit will be sent to me.

Steve Felix
Missoula Maintenance Chief

copies: Jason Shorten
Chad Seelye
Michael Ivanoff

October 18, 2019

TO: Kascie Herron
Lolo Watershed Group
P.O. Box 1354
Lolo, MT 59847

FROM: Marie Ann Zens Kimerly
17155 Lolo Creek Road
Lolo, MT 59847

RE: Letter of Support for Reducing Sediment and Promoting a Healthy Lolo Creek

I am a landowner on approximately 3,300 feet of Lolo Creek. I would like to support improvements to water quality, fisheries habitat, riparian condition and stream channel stability on this reach of Lolo Creek. Conserving fish and wildlife habitat is important to my land management.

The Lolo Creek Sediment Reduction Project led by Lolo Watershed Group (LWG) is proposing restoration along the entirety of Lolo Creek through my property, but in a phased approach. This specific project aims to prioritize the lower stretch of creek, by allowing for natural floodplain reconnection and channel meandering that historically moved freely during high and low water events. This project would reduce fine sediments, increase connectivity, enhance aquatic habitat and increase ecological function of the riparian and floodplain corridor. I support this project and will coordinate with LWG, DEQ, Fish Wildlife and Parks, and contractors on granting permission for access to the site.

Thank you,

Marie Ann Zens Kimerly

Marie Ann Zens Kimerly

Maps, Designs, Other Attachments

APPENDIX A

Lolo Watershed Group Board of Directors

Technical and Administrative Qualifications

Travis Ross – Board President

For the last 15 years, Travis has worked with the Missoula Valley Water Quality District an Environmental Health Specialist. Prior to that he worked in environmental monitoring and education in Birmingham, AL. He studied Biology, Environmental Science and Geography at Samford University.

Tom Morarre – Board Vice President

Tom is a retired Computer Scientist, and maintains a small herd of sheep for training purposes at his place on Mormon Creek. Tom has been on the Lolo Watershed Group advisory board since 2008. His goal is to maintain the agricultural benefits of the creek, such as livestock water and crop irrigation, while assuring that the health of the watershed is protected and preserved. He would also like to see the trout habitat of the creek returned to its former status as an excellent fishery. Tom has worked on the stream flow monitoring projects put in place by LWG and other conservation organizations.

Tana Doyle – Board Treasurer

Tana attended the University of Montana and received her Bachelor of Science in Business Administration, emphasis in accounting. She went on to obtain her Certified Public Accountant license and has worked in public accounting since 1996. Tana began working in Lolo in 2001 as a partner in the accounting firm Murphy & Doyle, PLLP and currently owns the accounting firm Doyle & Associates, P.C. in Lolo.

Marlee Ostheimer – Board Secretary

Marlee lives in Lolo and has been working with the National Forest Foundation (NFF) as a grantwriter / fundraiser for the past six and a half years. Before that, she attended the University of Montana, receiving a degree in Environmental Studies while also studying Natural Resource Conservation and nonprofit administration.

Deana DeWire – Board Member

Deana has a broad background in environmental research- from graduate work at the University of Montana to working at the Flathead Biological Station and more. She was formally the president of the Watershed Education Network and looks forward to

serving on another board. For the past ten years she has worked for Lolo National Forest as a hydrologic technician in the watershed program.

Lolo Watershed Group Advisory Board

- Jed Whiteley, Monitoring Coordinator, Clark Fork Coalition
- Shane Hendrickson, Fisheries Biologist, Lolo National Forest
- Ladd Knotek, Fisheries Biologist, Montana Fish, Wildlife & Parks
- Traci Sylte, Engineer/Hydrologist, Lolo National Forest
- Neva Larson, Former LWG Board Member and long time Lolo Creek resident.
- Wendy Berthold, Former LWG President.
- Kascie Herron, Former LWG President.

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P.O. Box 1956
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http://www.geumconsulting.com

TO: Kascie Herron, Lolo Watershed Group

FROM: Amy Sacry, Senior Restoration Ecologist/Biologist, Geum Environmental Consulting, Inc.
Marisa Sowles, Water Resource Specialist, Geum Environmental Consulting, Inc.

DATE: September 3, 2019

RE: Lolo Creek Zens Restoration Concept

The Montana Department of Environmental Quality (DEQ) has selected the Bitterroot Watershed as the target to receive the bulk of DEQ 319 project grand funding for the next two to three years. This funding, which the states receives under the Clean Water Act, is made available for projects designed to mitigate the effects of non-point source pollution. Lolo Creek is a tributary to the Bitterroot Watershed located near Lolo, Montana. Lolo Creek and many of its tributaries are listed as impaired waterbodies by DEQ. Upper and Middle Lolo Creek are on the 303(d) list for sediment and Total Maximum Daily Load (TMDL) values have been developed as targets for sediment delivery to the stream.

In 2013, the Lolo Watershed Group and partners completed the *Lolo Creek Watershed Restoration Plan.* The purpose of the LWG's WRP was to develop a 5-10 year plan to achieve conservation and restoration goals in the Lolo Creek watershed. The WRP describes the following as primary issues for fisheries, wildlife and water/quality quantity in the watershed:

- Loss of creek meanders due to channelization and confinement by armoring
- Lack of woody debris and diminished wetlands
- Dewatering and fish barriers

The WRP indicates that activities in lower Lolo Creek should include efforts to reach the diverse ownership and other stakeholders through education, outreach, and stewardship activities to help realize the LWG's vision of drought management, surface and ground water quantity improvement, weed reduction, healthy and well established streamside vegetation, proper stream structure and function, and reduction of fish entrainment in irrigation ditches.

The LWG contracted with Geum Environmental Consulting, Inc. (Geum) to help them identify potential projects along the mainstem Lolo Creek where actions could be taken to help meet the goals of the WRP and 319 program. Using aerial imagery, Geum identified several sections of the mainstem river where work could be done. The main criteria for potential site selection included: identified by partner, area to reactivate floodplains (i.e. not heavily channelized and armored), a minimum of 2,000 linear feet of channel on single ownership, signs of degradation obvious on imagery (i.e. low woody vegetation cover, straightened, over-widened, etc.). Based on this initial analysis, Geum identified eight locations where land owner outreach and on the ground site review would be valuable (Attachment A). Of the eight

sites, access was available for three: Mill Creek Streambank and Floodplain (Zens), Earl Tenant (U.S. Forest Service), and Mormon Creek Bridge (Hendrickson).

On August 26, 2019, Geum staff, Kascie Herron with LWG, and Eric Trum with DEQ, visited these sites to evaluate potential to implement restoration actions that meet WRG goals and would be appropriate for targeted 319 funding. Mormon Creek Bridge was determined to be a low priority as it would only include streambank stabilization, and has not significantly changed in the last 10 years. Earl Tenant was determined to have high restoration potential, but a project on private land was preferred to help meet LWG's goal of outreach within the watershed. The group discussed reaching out to the Forest Service to start the process of developing a project at Earl Tenant for 319 funding in November, 2020. The Mill Creek Streambank and Floodplain area located on the Zens property was determined to have high potential to meet both LWG and DEQ goals for Lolo Creek. Therefore, the remainder of this memo presents initial conceptual restoration actions for the Zens property.

Zens Property Existing Conditions

An overview of Lolo Creek on the Zens property is provided in Figure 1. The Zens property includes approximately 3,330 feet of Lolo Creek. The primary impairments to the stream include: channel confinement with riprap, channel straightening, channel over-widening, grazing that has reduced riparian vegetation cover, loss of instream cover (pools and woody debris, and accelerated streambank erosion.

The upper 250 feet of Lolo Creek on the property flows along Highway 12, which is stabilized by riprap (Figure 2). Upstream of the access bridge there is active lateral erosion on the right streambank that is progressing towards the access road south of the bridge. Downstream of the bridge, and likely as a result of channel stabilization, the channel has straightened and over-widened and consists of a long, shallow riffle with little in stream cover (Figure 3). The channel appears to still have good connection with the floodplain through this straightened section and the landowner indicated that out of bank flooding still frequently occurs south of the channel in this area. Riparian vegetation cover and diversity have been reduced by long term grazing in this area. Immediately along the channel, riparian vegetation is more diverse, with several age classes of cottonwoods and willows establishing on recent depositional features.

Downstream of the straight section, the channel turns to the north and the right bank is stabilized with large rock (Figure 4). Some active erosion is occurring at the upstream end of this berm in response to wood accumulation and beaver activity. The berm disconnects the channel from a diverse floodplain area with several historic over flow channels that have transitioned into floodplain wetlands (Figure 5). This diverse floodplain area extends from the north bend of the stream downstream to the end of the Zens property. Downstream of the berm active side channels with sign of recent beaver activity connect to the disconnected floodplain area (Figure 6). South of this area is a large horse pasture with several historic channel meander scrolls that support wetter vegetation (Figure 7).

The downstream most meander on the property is actively eroding into a low floodplain terrace (Figure 8). Streambank stabilization treatments, including log and rock vanes and rootwad revetments, were installed along this bank circa 2003 to reduce the accelerated lateral erosion. These treatments have since eroded out and the bank is poorly vegetated and continues to actively erode.

Figure 1. Overview of Zens Property on Lolo Creek.

Figure 2. Riprap downstream of access bridge.

Figure 3. Over-widened, straight section of channel downstream of bridge.

Figure 4. Rock berm on right bank at north meander bend.

Figure 5. Disconnected floodplain channel that has converted to wetland vegetation.

Figure 6. Side channel with current beaver activity.

Figure 7. Historic floodplain south of Lolo Creek at downstream end of property with old channel meander scrolls.

Figure 8. Downstream meander with active erosion.

Zens Property Restoration Actions

This section presents potential restoration actions and conceptual restoration action lay-outs for the Zens property. This information is provided to LWG to facilitate coordination with the landowner and DEQ and determine the level of project they are interested in pursuing at the site. This concept will be refined based on feedback from LWG and other partners. Once feedback is received, the concept will be refined with additional information on proposed treatments, a proposed schedule will be developed, and costs for design and implementation of the work will be estimated. The purpose of the concept and estimated costs are to support funding acquisition for the work.

The goal for restoration at the Zens Property is to maximize channel and floodplain function by increasing channel and floodplain diversity. As described above, the channel largely remains connected to the floodplain, and there are several areas that support good riparian and wetland vegetation and high topographic floodplain diversity. However, the channel is over-widened and lacks diversity, is confined by riprap in areas, and actively eroding in other areas. The restoration actions described in this section propose to increase channel diversity, reduce streambank erosion, and create and re-activate diverse floodplain areas.

Two scenarios were developed for applying restoration actions to the site. The first scenario represents a maximum restoration scenario and the second scenario provides an alternative to the maximum scenario and removes some of the more costly restoration action items. Restoration Action Scenario 1 is shown in Figure 9 and Restoration Action Scenario 2 is shown in Figure 10.

The restoration actions identified for the Lolo Creek Zens site are described below:

Relocate Lolo Creek away from Highway 12: The upper approximately 250 feet of Lolo Creek abuts Highway 12. Relocating the channel away from Hwy 12 would increase natural floodplain function and reduce the on-going maintenance and erosion associated with the access road and bridge. This action would require significant earthwork and relocation of or installation of a new access bridge.

Construct channel meanders to increase channel diversity and activate more floodplain area: Loss of creek meanders due to channelization and confinement was identified in the WRP as a primary degradation factor in Lolo Creek. The Zens property provides a good opportunity to increase channel meandering. Constructing channel meanders will increase channel length, provide an opportunity to create channel sections with narrower, deeper dimensions, and increase the area of active, diverse floodplain.

Narrow and deepen the channel: This section of Lolo Creek is shallow and over-widened compared to undisturbed and recent historic conditions. The landowner indicated that 20 years ago the channel was much narrower and deeper than the current condition. This action involves deepening and narrowing the channel through excavation and placement of fill, allowing the creation of pools and maximizing connectivity with existing or restored floodplain areas.

Add large woody debris to the channel and floodplain: A lack of woody debris was identified in the WRP as a primary degradation factor in Lolo Creek. This restoration action would include adding large woody debris to the channel and floodplain in the form of bank structures, channel spanning structures (particularly in side channels and floodplain feeder channel), and floodplain roughness to increase channel and floodplain diversity.

Construct side channel and floodplain feeder channels to increase floodplain diversity and wetlands: Diminished wetlands were identified in the WRP as a primary degradation factor in Lolo Creek. This action includes creating wetlands in segments of the channel that are abandoned when new channel meanders are constructed, and constructing side channels or feeder channels to activate these areas.

Remove berm along streambank to reactivate floodplain: A very diverse area of floodplain is currently disconnected from the channel by the presence of a rock berm, likely constructed to prevent down valley flooding. Removing the berm and allowing floodplain reactivation would increase overall stream and floodplain function by increasing flood water recharge into wetlands increasing water storage, retention of fine sediment, and filtering and slow release of stored groundwater.

Realign the channel away from the eroding streambank at the downstream end of the property. The streambank treatments installed to prevent lateral erosion at the downstream end of the property are no longer functioning and the bank is bare, vertical, and actively eroding. Instead of re-building the bank in its current location, this restoration action includes moving the channel to the south and re-building a floodplain between the channel and actively eroding bank. Not only will this provide a long-term solution to erosion in this location but will increase connectivity between the channel and diverse floodplain to the north at this location.

Increase floodplain wetland area: Historic channel meanders are present at the downstream end of the property on the south side of the creek. These meander swales support wet vegetation and appear to connect to the floodplain features that were deactivated by construction of the rock berm. This area provides a good opportunity to increase floodplain wetlands that connect to Lolo Creek during high flows. Construction or enhancement of wetlands in this area would also likely provide a good source of fill for the project.

Preserve existing high quality floodplain and riparian areas: There are several areas along the channel or within the existing floodplain that support diverse topography and riparian and wetland vegetation.

These areas include: active side channels, historic floodplain channels that have been disconnected and now support wetland vegetation, historic meander scrolls, and depositional features along the channel. These areas would be preserved or reactivated.

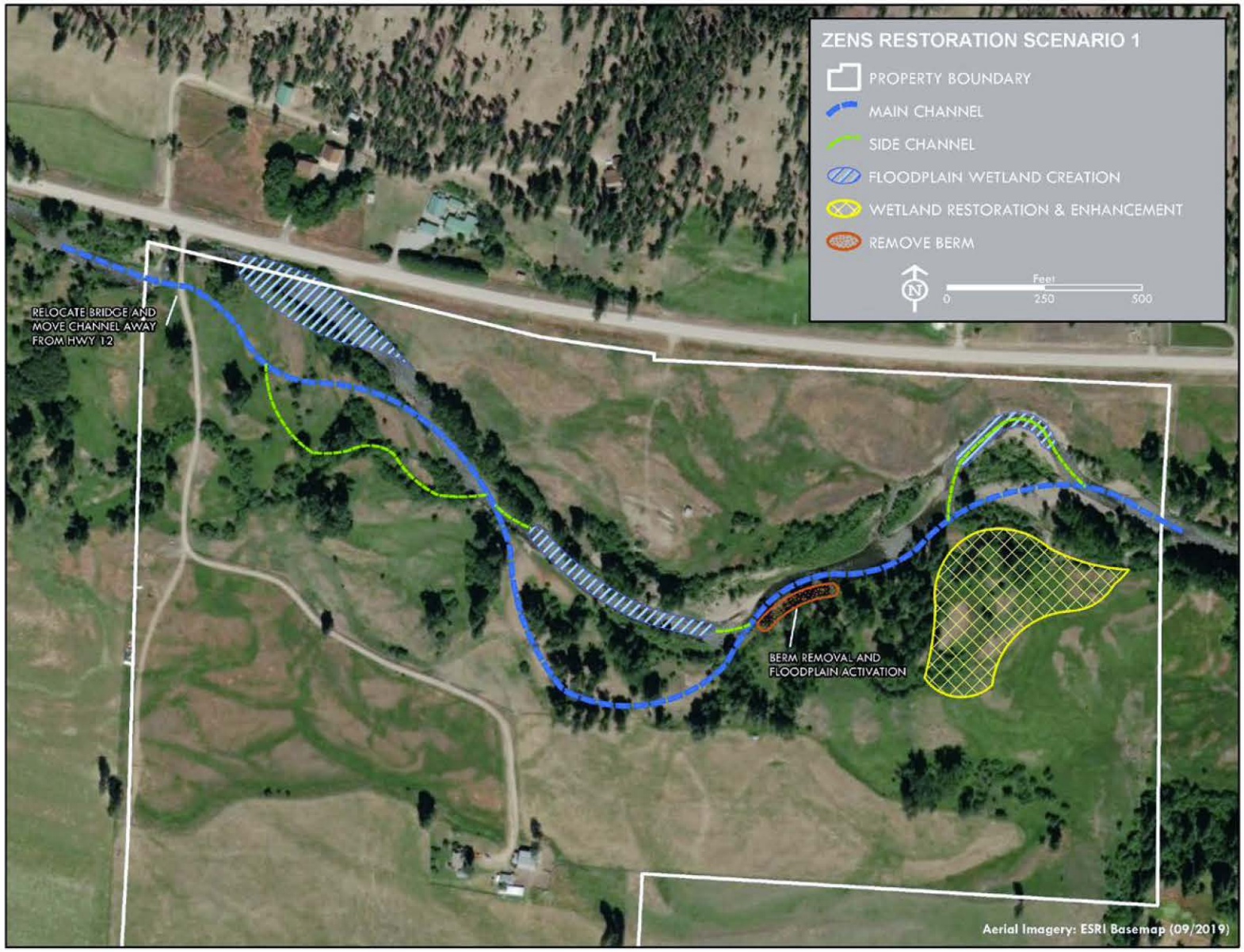


Figure 9. Lolo Creek Zens Site Restoration Scenario 1.

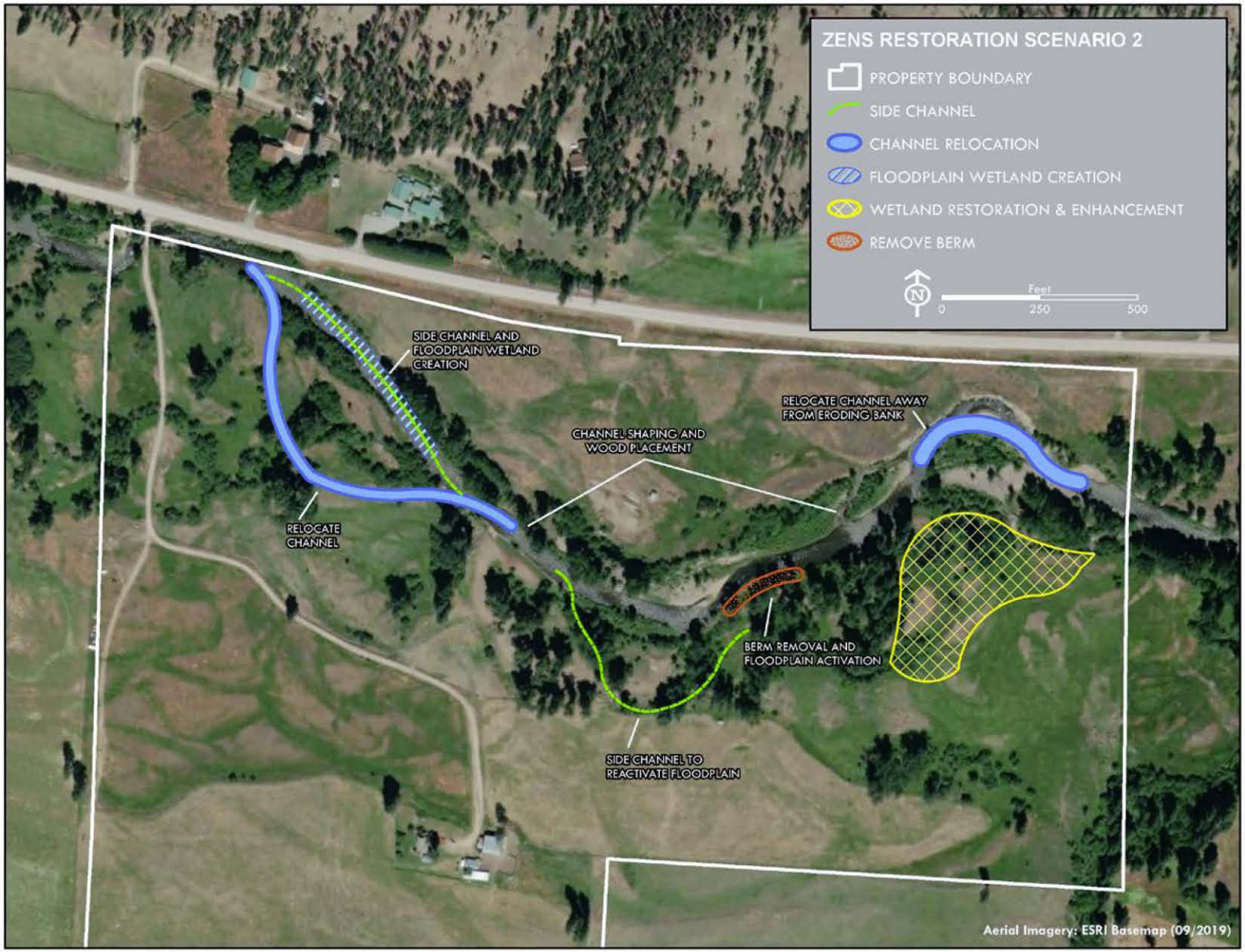


Figure 10. Lolo Creek Zens Site Restoration Scenario 2.

Attachment A. Lolo Creek Potential Restoration Projects

Project Name	Landowner[1]	Project Type
Mormon Creek Bridge	S. Hendrickson (downstream)	Streambank Restoration
Mill Creek Streambank and Floodplain	M. Zens	Channel Meandering, Floodplain/Riparian Enhancement, Streambank Restoration
Potomac Corp	Potomac Corp (OZ or Lolo Creek Ranch)	Channel Meandering, Floodplain/Riparian Enhancement, Large Wood Placement/Aquatic Habitat Enhancement
Bear Creek to Camp Creek	Cummins, U.S. Forest Service, Weyerhaeuser	Floodplain Enhancement, Large Wood Placement/Aquatic Habitat Enhancement
Clark Creek	U.S. Forest Service, Karl L. Tyler	Channel Meandering, Floodplain Enhancement, Large Wood Placement/Aquatic Habitat Enhancement
Potato Gulch Meadow	Karl L. Tyler	Large Wood Placement/Aquatic Habitat Enhancement, Streambank Restoration, Riparian Enhancement
Earl Tenant	U.S. Forest Service	Large Wood Placement, Floodplain Enhancement
Powell Creek Meadow	Beck	Floodplain/Riparian Enhancement, Channel Meandering, Streambank Restoration

[1] Identified based on Montana State Library (MSL) cadastral data

LOLO CREEK ZENS RESTORATION PROJECT COST ESTIMATE

Prepared by A. Sacry (Geum) and J. Muhlfeld (River Design Group), 10/30/2019

Design, Permitting & Reporting	
Data Collection, Hydrologic Analysis	$7,000.00
Prepare Design	$7,000.00
Prepare Construction Plan Set	$6,000.00
Wetland Delineation	$4,000.00
Permit Preparation	$4,000.00
No Rise Certification	$3,000.00
As-built Report	$4,000.00
	$35,000.00

ESTIMATED CONSTRUCTION COSTS PHASES 2 and 3	Unit	Estimated Quantity	Estimated Unit Cost	Total Estimated Cost
1. Mobilization, GPS Equipment, Crew Per Diem	lump sum	1	$18,000.00	$18,000.00
2. Clear and Grub	lump sum	1	$2,000.00	$2,000.00
3. Clearwater Diversions, Water Management, BMPs	lump sum	1	$2,500.00	$2,500.00
4. Salvage, Preserve and Transplant Existing Vegetation	lump sum	1	$4,000.00	$4,000.00
5. Construct and Improve Roads and Staging Areas	lump sum	1	$2,500.00	$2,500.00
6. Construct Channel Streambed Station 8+00 to 15+00, Station 25+00 to 31+25	linear feet	1,325	$40.00	$53,000.00
7. Shape and Enhance Channel Streambed Station 15+00 to 25+00	linear feet	1,000	$22.00	$22,000.00
8. Furnish Wood	lump sum	1	$18,000.00	$18,000.00
9. Furnish Streambed and Streambank Alluvium (On Site)	cubic yard	2,775	$8.00	$22,200.00
10. Construct Side Channels	linear feet	1,298	$5.00	$6,490.00
11. Reconnect Side Channels	linear feet	3,469	$1.00	$3,469.00
12. Construct Large Wood Structures	each	10	$1,250.00	$12,500.00
13. Construct Woody Debris Matrix Streambank Treatment (Riffles/Passive)	linear feet	1,800	$12.00	$21,600.00
14. Construct Woody Debris Matrix Streambank Treatment (Meanders/Active)	linear feet	825	$20.00	$16,500.00
15. Beaver Dam Analogs in Side Channels	each	20	$250.00	$5,000.00
16. Willow Cuttings	each	10,500	$1.00	$10,500.00
17. Alcove Enhancement	each	1	$1,500.00	$1,500.00
18. Floodplain Treatment (topography, woody debris, willow trenches)	acres	4	$1,500.00	$6,000.00

19. Wetland Enhancement	acres	2.5	$1,500.00	$3,750.00
20. Seeding	acres	8	$150.00	$1,200.00
				$232,709.00
Construction Management (7.5% of estimated Total Construction Cost)	lump sum	1	$17,453.18	$17,453.18
			TOTAL Estimated Construction Cost	**$250,162.18**

TOTAL ESTIMATED COST DESIGN, PERMIT & BUILD **$285,162.18**

LOLO CREEK ZENS RESTORATION CONCEPT SUPPLEMENTAL INFORMATION

TREATMENT DESCRIPTIONS:

Construct Channel: Realign and reconstruct the main channel to increase sinuosity, restore narrower and deeper channel dimensions, and increase floodplain connectivity. Channel dimensions would be narrower and deeper than existing conditions. The sinuosity and channel dimensions would support processes such as creation of pools for fish habitat and allow the main channel to access side channels and wetland areas during high flows. Channel construction would also relocate the channel away from an outside meander bend with a tall, vertical, eroding bank that contributes sediment to the main channel, is migrating north toward Highway 12, and is actively incising the channel.

Channel Reshaping: Reshape existing channel in areas where the new design channel overlaps with the existing main channel. This treatment includes shaping the existing channel to have narrow dimensions and more sinuosity. This treatment will increase pool frequency and depth and increase floodplain connectivity.

Streambank Treatments: Streambank treatments would be built along the newly constructed channel and existing channel that is reshaped. Streambank treatments include **Woody Debris Matrix** and **Large Wood Structures.** Woody Debris Matrix treatments are built along all streambanks except point bars. These treatments consist of layers of woody debris, brush, dormant willow cuttings, and a mix of coarse and fine substrate. The purpose of this treatment is to increase near channel roughness to protect banks while willows establish and increase aquatic habitat diversity. Large Wood Structure treatments are built intermittently along outside meander bends and consist of larger wood than woody debris matrix treatments. Large wood structures consist of a mix of large and small wood. One or two large woody structures would be located along an outer meander bend. The large wood directs flow away from the channel bank and supports hydraulic conditions that create and maintain pools for fish refugia. Dormant willow cuttings and mature shrub transplants are integrated into the Large Wood Structures.

Figure 1. Example streambank treatments - woody debris matrix and large wood structure.

Side Channel Construction: Side channels will be constructed along the main channel where there is enough width and elevations can support them. Side channels will be designed to be activated are relatively low return flow intervals (i.e. every year), and may be designed to flow year round. Side channels will be constructed to support diverse aquatic habitat such as pools and riffles to increase available habitat for aquatic species. Streambank treatments similar to those constructed along the main channel will also be constructed along side channels.

Existing Distributary Channel Activation: There are several old channel features and scrolls within the project area. Most of these are no longer connected to the main stream channel due to the construction of small levees, bank armoring or channel migration. This treatment includes excavating access points along the main channel to re-activate the existing network of distributary channels to increase floodplain connectivity, invigorate riparian vegetation establishment and expansion and provide overall increased floodplain ecological function, such as flood storage and retention. These distributary channels would be activated at various flows depending on location and existing elevation. Minimal work within the existing distributary channels is anticipated.

Preservation: There are several areas of high quality riparian vegetation establishing along Lolo Creek within the project reach. These areas consist of several age classes of cottonwoods, willows, and other riparian shrubs such as dogwood and alder. These areas will be preserved and integrated grading plan development.

Channel Fill and Wetland Creation: Segments of the existing channel that are abandoned due to channel realignment will be graded to support diverse wetland and riparian vegetation communities. These abandoned channel segments would not be filled completely but instead graded to an elevation that maintains hydrologic connectivity to baseflows. These areas would recruit native woody riparian species such as willows, cottonwoods, dogwoods and alder. Plugs would be constructed at the upstream and downstream ends of the abandoned main channel segments to avoid recapture by the main channel. Additional plugs may be included within the abandoned main channel to further reduce the risk of capture.

Alcove Enhancement: One backwater feature connected to the main channel is present in the project reach. This backwater is activated during high flows and stores fine sediment and woody debris. As a result, diverse wetland vegetation has established in this area. This area would be preserved and enhanced through increased depth and addition of woody debris to enhance aquatic habitat and support woody riparian growth.

Floodplain Treatment: All areas of newly constructed floodplain or floodplain lowered to activate disconnected distributary channels will be treated to increase diversity and support riparian vegetation community establishment. Some floodplain areas will be lowered to increase hydrologic connectivity with the main channel and provide surfaces for natural recruitment of riparian species such as willow, alder, and cottonwood. All constructed floodplain areas will be roughened topographically and with woody debris to increase and provide short term erosion control. These surfaces will be revegetated by constructing

trenches with dormant willow cuttings and cottonwood pole cuttings, salvaged trees, shrubs, and native sod, and with native seed. Some containerized plants may be installed on floodplain surfaces, but only if sufficient transplants are not available.

Figure 2. Surface Roughness and Woody Debris.

Beaver Dam Analogs: Beaver are currently active in side channels within the project reach. The dams constructed by beaver function to increase floodplain activation, increasing the area available for wetland creation and woody riparian vegetation expansion. These dams also function to slow flood velocities and retain water in the floodplain longer. Structure that mimic the function of beaver dams will be constructed in side channels and re-activated distributary channels. Beaver dam analogs are constructed using woody debris, native cobble and gravel, and dormant willow cuttings.

Wetland Enhancement: Historic floodplain consisting of diverse topography is present on the south side of the channel at the downstream end of the project reach. This area could be enhanced through grading and revegetation to increase wetland area and enhance overall wetland diversity and ecological function.

REVEGETATION PLAN:

The revegetation plan consists of the following components:

- Preservation: Areas along the main channel that support native woody riparian vegetation will be integrated into project grading and preserved.
- Willow cuttings: Dormant willow cuttings will be incorporated into all streambank treatments and constructed floodplain areas.
- Shrub and Sod Transplants: Desirable woody species, such as dogwood, alder, willow, and cottonwood within construction limits will be salvaged and re-used in streambanks or constructed floodplains.
- Seeding: All disturbed areas and newly constructed floodplains will be seeded with seed mixes consisting of desirable native species.
- Containerized Plants: Some containerized plants (cottonwood, dogwood, alder, and willow) may be planted on newly constructed floodplain surfaces if sufficient transplants are not available.

EXAMPLE BEST MANAGEMENT PRACTICES:

Some best management practices will be determined through the permitting process, but typical practices included in construction documents include:

- Construction will occur during seasonal low flow.
- Construction will occur in the dry to the extent possible by constructing clear water diversion channels or isolating work areas.
- All trees, vegetation and land areas not located within project construction, staging or earthwork limits will be protected and care taken to avoid unnecessary damage to natural vegetation.
- Stream crossings will be minimized during construction.
- Equipment will be cleaned of external oil, grease, dirt, and mud, and all leaks will be repaired prior to entering areas that drain directly to streams or wetlands. Equipment will be in a well-maintained condition to minimize the likelihood of a fluid leak. Fluid spill containment equipment will be present on site and ready for use should an accidental spill occur.
- All equipment will be pressure washed prior to arriving on site to reduce potential spread of weeds.
- Fuel storage and refueling will not occur within 300 feet of perennial drainages and wetlands or within 150 of ephemeral drainages. Fuel spill containment and cleanup materials will be present and available on-site.
- Erosion control measures, such as straw bales, straw wattles or silt fence will be installed between construction areas and any live water, wetlands or drainages with potential for live water. A supply of erosion control materials will be kept on hand to respond to sediment emergencies.
- Excavated material stockpiles and equipment staging areas will be designated to minimize soil disturbance and vegetation disturbance, and prevent sediment delivery to streams or wetlands.

LOLO CREEK ZENS RESTORATION CONCEPT SUPPLEMENTAL INFORMATION

TREATMENT DESCRIPTIONS:

Construct Channel: Realign and reconstruct the main channel to increase sinuosity, restore narrower and deeper channel dimensions, and increase floodplain connectivity. Channel dimensions would be narrower and deeper than existing conditions. The sinuosity and channel dimensions would support processes such as creation of pools for fish habitat and allow the main channel to access side channels and wetland areas during high flows. Channel construction would also relocate the channel away from an outside meander bend with a tall, vertical, eroding bank that contributes sediment to the main channel, is migrating north toward Highway 12, and is actively incising the channel.

Channel Reshaping: Reshape existing channel in areas where the new design channel overlaps with the existing main channel. This treatment includes shaping the existing channel to have narrow dimensions and more sinuosity. This treatment will increase pool frequency and depth and increase floodplain connectivity.

Streambank Treatments: Streambank treatments would be built along the newly constructed channel and existing channel that is reshaped. Streambank treatments include **Woody Debris Matrix** and **Large Wood Structures.** Woody Debris Matrix treatments are built along all streambanks except point bars. These treatments consist of layers of woody debris, brush, dormant willow cuttings, and a mix of coarse and fine substrate. The purpose of this treatment is to increase near channel roughness to protect banks while willows establish and increase aquatic habitat diversity. Large Wood Structure treatments are built intermittently along outside meander bends and consist of larger wood than woody debris matrix treatments. Large wood structures consist of a mix of large and small wood. One or two large woody structures would be located along an outer meander bend. The large wood directs flow away from the channel bank and supports hydraulic conditions that create and maintain pools for fish refugia. Dormant willow cuttings and mature shrub transplants are integrated into the Large Wood Structures.

Figure 1. Example streambank treatments - woody debris matrix and large wood structure.

Side Channel Construction: Side channels will be constructed along the main channel where there is enough width and elevations can support them. Side channels will be designed to be activated are relatively low return flow intervals (i.e. every year), and may be designed to flow year round. Side channels will be constructed to support diverse aquatic habitat such as pools and riffles to increase available habitat for aquatic species. Streambank treatments similar to those constructed along the main channel will also be constructed along side channels.

Existing Distributary Channel Activation: There are several old channel features and scrolls within the project area. Most of these are no longer connected to the main stream channel due to the construction of small levees, bank armoring or channel migration. This treatment includes excavating access points along the main channel to re-activate the existing network of distributary channels to increase floodplain connectivity, invigorate riparian vegetation establishment and expansion and provide overall increased floodplain ecological function, such as flood storage and retention. These distributary channels would be activated at various flows depending on location and existing elevation. Minimal work within the existing distributary channels is anticipated.

Preservation: There are several areas of high quality riparian vegetation establishing along Lolo Creek within the project reach. These areas consist of several age classes of cottonwoods, willows, and other riparian shrubs such as dogwood and alder. These areas will be preserved and integrated grading plan development.

Channel Fill and Wetland Creation: Segments of the existing channel that are abandoned due to channel realignment will be graded to support diverse wetland and riparian vegetation communities. These abandoned channel segments would not be filled completely but instead graded to an elevation that maintains hydrologic connectivity to baseflows. These areas would recruit native woody riparian species such as willows, cottonwoods, dogwoods and alder. Plugs would be constructed at the upstream and downstream ends of the abandoned main channel segments to avoid recapture by the main channel. Additional plugs may be included within the abandoned main channel to further reduce the risk of capture.

Alcove Enhancement: One backwater feature connected to the main channel is present in the project reach. This backwater is activated during high flows and stores fine sediment and woody debris. As a result, diverse wetland vegetation has established in this area. This area would be preserved and enhanced through increased depth and addition of woody debris to enhance aquatic habitat and support woody riparian growth.

Floodplain Treatment: All areas of newly constructed floodplain or floodplain lowered to activate disconnected distributary channels will be treated to increase diversity and support riparian vegetation community establishment. Some floodplain areas will be lowered to increase hydrologic connectivity with the main channel and provide surfaces for natural recruitment of riparian species such as willow, alder, and cottonwood. All constructed floodplain areas will be roughened topographically and with woody debris to increase and provide short term erosion control. These surfaces will be revegetated by constructing

trenches with dormant willow cuttings and cottonwood pole cuttings, salvaged trees, shrubs, and native sod, and with native seed. Some containerized plants may be installed on floodplain surfaces, but only if sufficient transplants are not available.

Figure 2. Surface Roughness and Woody Debris.

Beaver Dam Analogs: Beaver are currently active in side channels within the project reach. The dams constructed by beaver function to increase floodplain activation, increasing the area available for wetland creation and woody riparian vegetation expansion. These dams also function to slow flood velocities and retain water in the floodplain longer. Structure that mimic the function of beaver dams will be constructed in side channels and re-activated distributary channels. Beaver dam analogs are constructed using woody debris, native cobble and gravel, and dormant willow cuttings.

Wetland Enhancement: Historic floodplain consisting of diverse topography is present on the south side of the channel at the downstream end of the project reach. This area could be enhanced through grading and revegetation to increase wetland area and enhance overall wetland diversity and ecological function.

REVEGETATION PLAN:

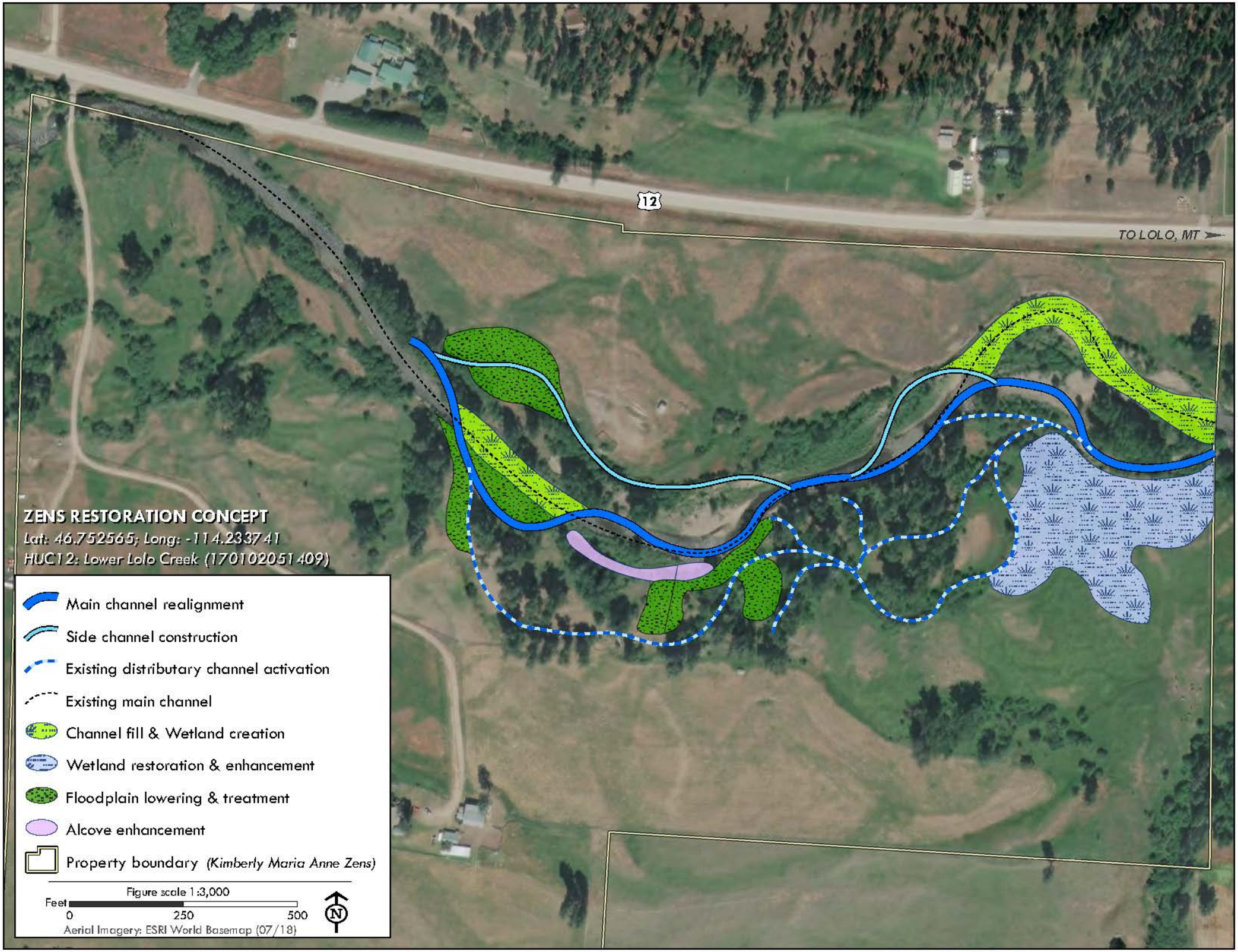
The revegetation plan consists of the following components:

- Preservation: Areas along the main channel that support native woody riparian vegetation will be integrated into project grading and preserved.
- Willow cuttings: Dormant willow cuttings will be incorporated into all streambank treatments and constructed floodplain areas.
- Shrub and Sod Transplants: Desirable woody species, such as dogwood, alder, willow, and cottonwood within construction limits will be salvaged and re-used in streambanks or constructed floodplains.
- Seeding: All disturbed areas and newly constructed floodplains will be seeded with seed mixes consisting of desirable native species.
- Containerized Plants: Some containerized plants (cottonwood, dogwood, alder, and willow) may be planted on newly constructed floodplain surfaces if sufficient transplants are not available.

EXAMPLE BEST MANAGEMENT PRACTICES:

Some best management practices will be determined through the permitting process, but typical practices included in construction documents include:

- Construction will occur during seasonal low flow.
- Construction will occur in the dry to the extent possible by constructing clear water diversion channels or isolating work areas.
- All trees, vegetation and land areas not located within project construction, staging or earthwork limits will be protected and care taken to avoid unnecessary damage to natural vegetation.
- Stream crossings will be minimized during construction.
- Equipment will be cleaned of external oil, grease, dirt, and mud, and all leaks will be repaired prior to entering areas that drain directly to streams or wetlands. Equipment will be in a well-maintained condition to minimize the likelihood of a fluid leak. Fluid spill containment equipment will be present on site and ready for use should an accidental spill occur.
- All equipment will be pressure washed prior to arriving on site to reduce potential spread of weeds.
- Fuel storage and refueling will not occur within 300 feet of perennial drainages and wetlands or within 150 of ephemeral drainages. Fuel spill containment and cleanup materials will be present and available on-site.
- Erosion control measures, such as straw bales, straw wattles or silt fence will be installed between construction areas and any live water, wetlands or drainages with potential for live water. A supply of erosion control materials will be kept on hand to respond to sediment emergencies.
- Excavated material stockpiles and equipment staging areas will be designated to minimize soil disturbance and vegetation disturbance, and prevent sediment delivery to streams or wetlands.


12
TO LOLO, MT
ZENS RESTORATION CONCEPT
Lat: 46.752565; Long: -114.233741
HUC12: Lower Lolo Creek (170102051409)
Main channel realignment
Side channel construction
Existing distributary channel activation
Existing main channel
Channel fill & Wetland creation
Wetland restoration & enhancement
Floodplain lowering & treatment
Alcove enhancement
Property boundary (Kimberly Maria Anne Zens)
Figure scale 1:3,000
Feet
0
250
500
N
Aerial Imagery: ESRI World Basemap (07/18)

ZENS - EXSITING CHANNEL ALIGNMENT
Existing main channel
Property boundary
Feet
0
250
500
Aerial Imagery: ESRI Basemap (09/2019)
N
12
TO LOLO, MT
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
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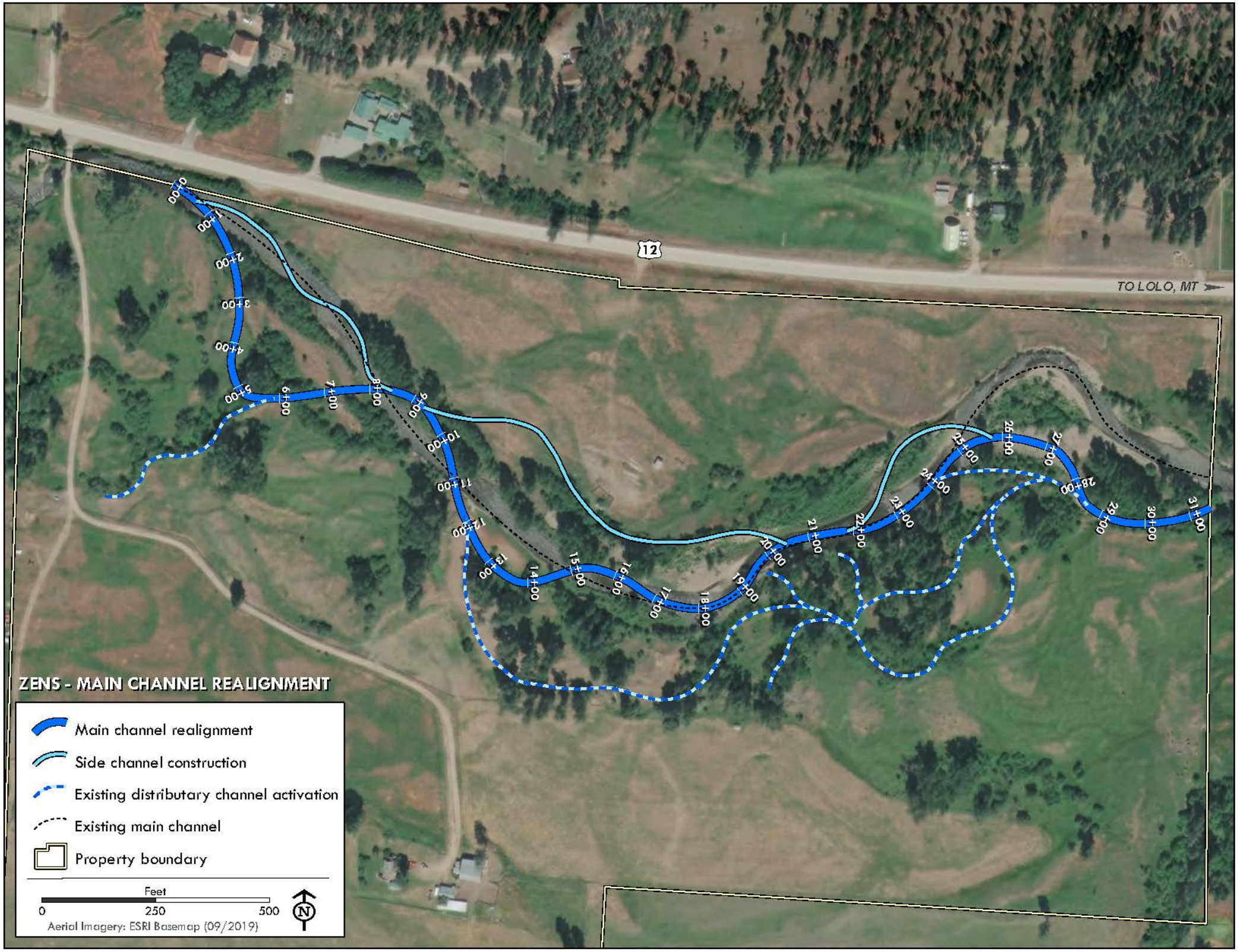
ZENS - MAIN CHANNEL REALIGNMENT
Main channel realignment
Side channel construction
Existing distributary channel activation
Existing main channel
Property boundary
Feet
0
250
500
Aerial Imagery: ESRI Basemap (09/2019)
12
TO LOLO, MT
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1+00
2+00
3+00
4+00
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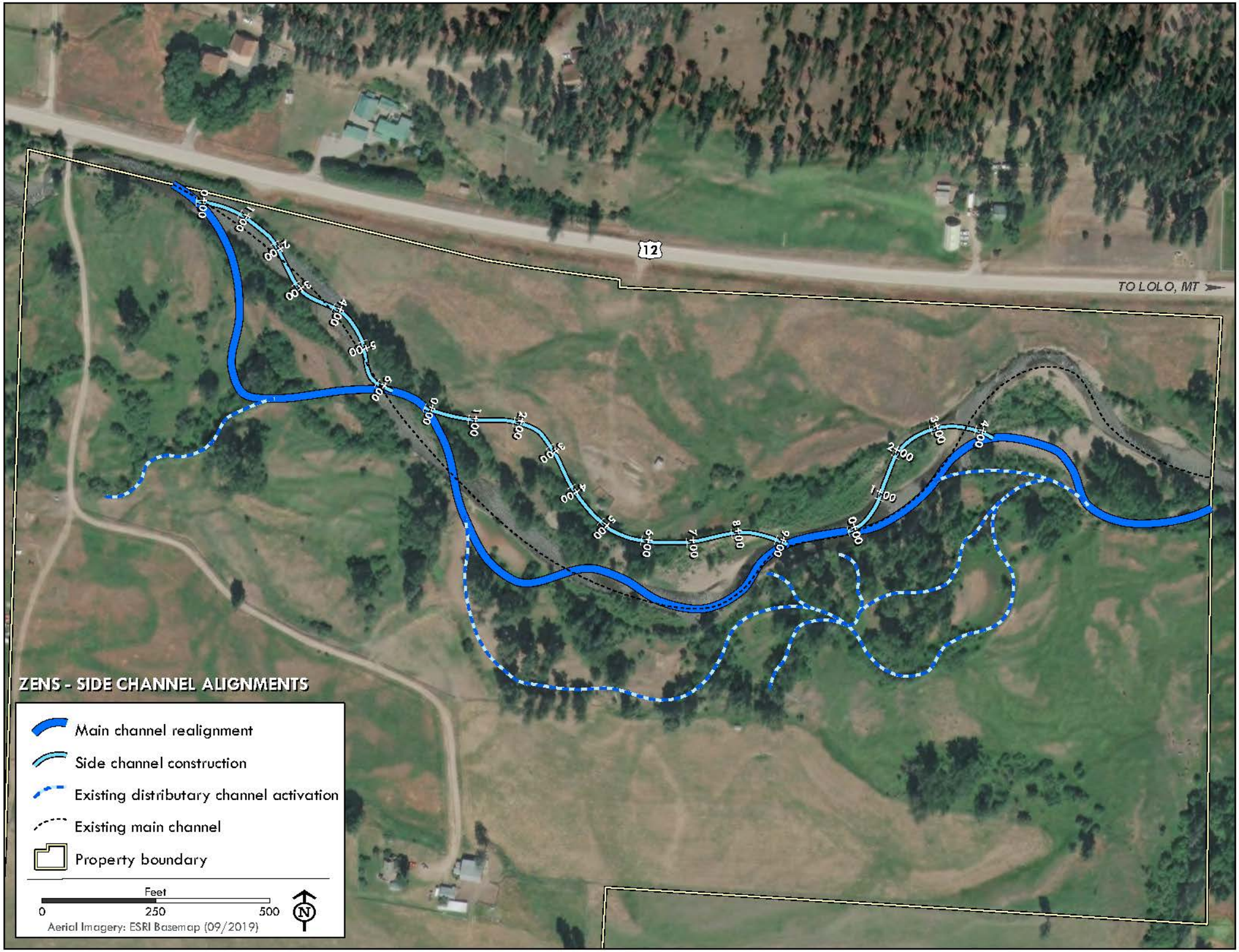
ZENS - SIDE CHANNEL ALIGNMENTS
Main channel realignment
Side channel construction
Existing distributary channel activation
Existing main channel
Property boundary
Feet
0
250
500
N
Aerial Imagery: ESRI Basemap (09/2019)
12
TO LOLO, MT